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Learning Morse

APPROVED METHODS
OF MASTERING
THE INTERNATIONAL CODE



Published from the Offices of

Wireless World

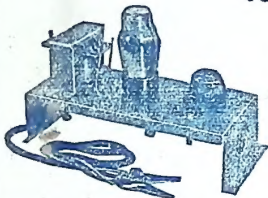
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LEARNING MORSE

A Guide to Wireless Operating

By the Editor of *Wireless World*

IT is a tribute to the genius of Samuel Morse that, in spite of the vast difference between the crude telegraph of his day and modern communication methods, the code he devised in 1832 has survived for over a hundred years. True, the original "American Morse" has undergone modifications, but the basic conception remains. The International Morse Code, with which we are concerned in this book, is built up of three elements: the dot, or short signal; the dash, or long signal; and the space. Letters and figures are represented by various combinations of dots and dashes. In the original code the space played a more important part than in the present version, in which its length is not subject to any change in the composition of individual letter symbols. The dot is the basic element, the dash is equal in length to three dots, and the spacing between these elements of the letter is equal in length to one dot. Between letters the spacing equals three dots and between words five dots.

Some difference of opinion still exists as to the best way to learn the code, as well as in regard to details of operating technique. It is proposed in this book, however, to avoid all controversy, which can only bewilder the learner. All debatable points which must be touched upon have been well ventilated in the correspondence columns of *Wireless World*, and the student can rest assured that the methods or practices here advocated are those supported by the greatest weight of informed opinion. So now to work.

The beginner must obviously start by memorising the code, which is printed on pp. 8 and 9; the combination of morse elements corresponding to each letter of the alphabet, figure and punctuation mark must be so firmly impressed on his mind that they can be remembered without conscious effort. At the very outset it should be

stressed that there is a right and wrong way of setting about this not-too-formidable task.

As wireless reception is concerned with sound signals, the aim should be to memorise rhythmic sounds rather than graphical symbols. In other words, the letter A (— —) should be associated with the idea of a short sound followed by a longer one; it should not conjure up a mental picture of a short and long mark on paper. This is why most of the aids to memory that have been put forward, ingenious as some of them are, do not fully meet the case. As a rule, they encourage the learner to form a graphical conception of the symbols that will be positively harmful to his progress, as everything must be unlearned when he comes to the next stage, and is concerned solely with sounds.

It will be helpful if the student, while engaged in the task of memorising the symbols, repeats them to himself in a form that bears some relationship to their true sounds. Thus A may be memorised as dit-dah, and B as dah-dit-dit. The "dit" is of course spoken as quickly as possible, while the "dah" sound is drawn out. It has been suggested that the substitution of "de" (as in defence) for the conventional "dit" is conducive to more correct spacing.

Another plan is to whistle the symbols, or perhaps more mercifully to those within earshot, to "buzz" or rather to "hiss" them quietly between clenched teeth. Thus A will sound like buzz buz . . . z . . . z and N buz . . . z . . . z buzz. Time spent in acquiring the knack will not be wasted, as the sounds of morse symbols memorised in this way will, even at this early stage, impress themselves on the student's subconscious mind during the process of learning.

Incorrect Procedure

It is not always wise to attempt to hasten the memorising of letters by arranging them in groups—letters composed entirely of dots or of dashes; opposites; or in any similar way. If one does so, there is always a tendency to think of each letter in relation to another—a roundabout way of doing things. For similar reasons it is well to

make no attempt to memorise the letters in their proper alphabetical order, as by doing so the beginner may find himself running mentally through half the alphabet before he finds the letter he wants.

If the learner has memorised the alphabet and numerals in the way that has been advocated, he will now be ready to make rapid progress when he embarks on the next stage—that of listening to practice signals sent by means of a buzzer or valve oscillator. Let us first assume that he enjoys the advantage of having a competent operator to send practice signals to him. It is strongly advocated that, except at the very earliest stage, the symbols for individual letters should be sent at a relatively high speed, corresponding to a rate of 12 to 18 words per minute. Though the spacing between the elements of individual letters should be in the correct ratio, spacing between letters and words should at first be greatly exaggerated in order that the learner may have time to think about what he has just heard. The objection to sending the letters at a very slow speed, with long drawn-out dots and dashes, is that they then tend to lose their rhythmic sound character and the learner is tempted to revert to the bad old method of trying to recognise them by the elements of their composition rather than by their sound as a unit. As the learner gains confidence, spacing between letters and words should of course be gradually reduced until it finally reaches the correct ratio.

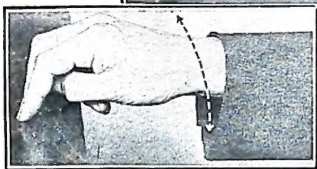
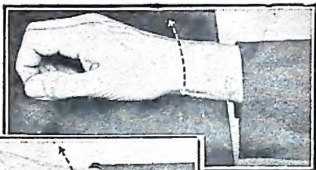
Reception Comes First

In general, it is best not to make a start with the sending of signals until the ability to read them with some facility has been acquired. But those who are learning the code without outside assistance must of necessity begin to “send to themselves” at a fairly early stage.

Before beginning to manipulate a transmitting key it is strongly recommended that the beginner should learn to control the action of his muscles by going through the movements of sending. The first two fingers are placed on the edge of the table and the wrist is worked up and down in conformity with the morse symbols.

Alternatively, the under-side of the wrist may be rested on the table in the manner shown in the accompanying illustration.

The motions of signalling are then gone through in much the



Manipulation of a morse key should be preceded by wrist exercises

same manner, long and short contacts between wrist and table being made in accordance with the code. It is important during these exercises that movement should be confined to the wrist ; the elbow should not be moved.

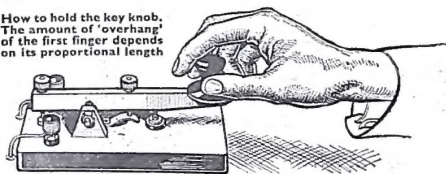
We now come to one of the most important stages—actual manipulation of the morse key. Every effort should be made to avoid a bad style, which, if acquired at the outset, may persist through life. The operator should sit squarely and comfortably in front of his table, with his chair at such a height that the elbow, when hanging naturally and freely at the side, is on a level with the key knob. The forearm should be horizontal and in line with the bar of the key.

Nature does not provide us with hands and fingers of strictly standardised proportions, and so no hard-and-fast rules can be laid down as to how the key knob should be held. However, the accompanying sketch will show the general principles, to which the reader can adapt himself according to the proportions of his own hand. The thumb

should be placed as shown on the side of, and below, the top of the knob, where it is in a position to exert a slight upward pressure. The first and second fingers, slightly bent, rest on the top of the knob as shown, the amount of overhang depending on their proportional length. With short fingers it will be much less than shown, and the tip of the first finger may actually rest on the knob. The second finger is rather more bent than the first, and, in conjunction with the thumb provides the main controlling hold on the key. The grip, which should be light, but firm enough to ensure control, is best compared with a writer's hold of his pen, but the comparison should not be carried too far, as there is no movement of the fingers, as in writing.

The closing of the key contacts, and thus the formation of the morse characters, is effected entirely by wrist action, and not by downward pressure of the fingers or of the arm as a whole. The wrist is moved up and down to correspond with the elements of the morse symbols, the key contacts being closed rather by the weight of the lowered wrist than by conscious exertion of muscular power in a downward direction. Do not forget that there should be no movement of the elbow, and that the wrist should be lowered no farther for a dash than for a dot.

How to hold the key knob.
The amount of 'overhang'
of the first finger depends
on its proportional length

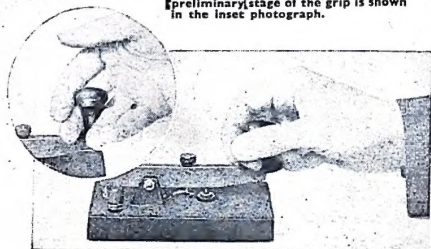


One of the difficulties in the way of acquiring the correct wrist action so essential for good telegraphy is that we have been accustomed all our lives to performing such apparently comparable operations as manipulating an electric light switch or actuating a bell push mainly by action of the fingers. One cannot work a morse key

that way ; the fingers should serve merely as the medium through which movements of the wrist are transmitted to the bar of the key. The habits of a lifetime are hard to break, and at first the right method of closing the key contacts will seem awkward. But—believe it or not—it is really not half so awkward as “finger tapping.” Only in the pages of the novelists or the writings of lay journalists does a wireless operator “tap out a message.” He doesn’t use a “tapping key,” either.

A useful trick that may help the beginner to avoid placing too much reliance on his finger muscles is worth while describing here. By its use, the fingers are figuratively short-circuited, and the learner is virtually compelled to acquire the correct wrist action. The method,

Cultivating wrist action: This method of holding the key, if used occasionally in the early stages, encourages the beginner to depend upon his wrist for closing the key contacts. The preliminary stage of the grip is shown in the inset photograph.



which works best with the “Post Office” type of key, is to grip the neck of the knob between the second and third fingers and then to close the hand lightly over it ; the first joint of the thumb rests against the side of the knob. The accompanying photographs will make this clear.

With muscles relaxed, the learner should first practise sending a continuous series of dots by making rapid up-and-down wrist movements. The action at this stage may almost be described as “waggling” the wrist.

Attention should then be paid to securing uniformity in the duration of the dots and in the spacing between them. One may then proceed to exercise more complete control over the wrist movements by transmitting the "all-dot" symbols for E, I, S, H and 5 before tackling the rest of the alphabet. The spring tension of the key should be rather greater than that appropriate for normal manipulation. There will be a tendency to apply pressure to the knob in a sideways as well as in a downwards direction, but that does not greatly matter.

It should be stressed that the method just described is purely a temporary subterfuge, advocated only for occasional use in the initial stages; it should alternate with the correct method, described earlier, and should be completely forgotten when the correct style has been acquired.

Muscular Control

The golden rule is to cultivate flexibility of the wrist, and to strive after complete control of the wrist muscles. Most of us find difficulty in mastering a few of the letters; C, Q and Y are common pitfalls, while others are troubled by F, L and the figures 4 and 6. The wrist seems unable to obey our will in forming the characters and the desired controlling impulses refuse to flow smoothly from brain to key contacts, as they should. There is no need to suffer under an inferiority complex in such cases; concentrate on practising short groups of letters containing the troublesome ones, and the difficulty will soon disappear. Choosing the right sequence of practice letters often helps, as the nature of morse is such that a particular letter often flows easily from the wrist when preceded by another to which it is rhythmically complementary.

To help readers to put into effect this aid to mastering those particular symbols which give them trouble, a series of rhythmic practice groups are printed at the foot of page 16. The word "rhythmic" is used for want of a better; although rhythm enters into the matter, it would perhaps be more correct to say that the letters are arranged in a sequence that experience shows to make for easy sending. The procedure is to practise sending the normal code groups printed on the page mentioned, and,

(Continued on page 10)

The International

A dash is equal to three dots in time while the interval between the dots and dashes in a letter equals a dot in time. Between the letters in a word the interval is equal to three dots and between words five dots.

THE ALPHABET

A	— —	N	— —
B	— — — —	O	— — — —
C	— — — —	P	— — — —
D	— — —	Q	— — — —
E	—	R	— — —
F	— — — —	S	— — —
G	— — — —	T	—
H	— — — —	U	— — —
I	— —	V	— — — —
J	— — — — —	W	— — — —
K	— — — —	X	— — — —
L	— — — —	Y	— — — —
M	— — —	Z	— — — —

ACCENTED LETTERS

Ä	— — — —
Á or Â	— — — —
CH	— — — —
É	— — — —
Ñ	— — — —
Ö	— — — —
Ü	— — — —

* The "brackets" and "underline" signs are trans-

al Morse Code

NUMERALS

1	— — — — —	6	— — — — —
2	— — — — —	7	— — — — —
3	— — — — —	8	— — — — —
4	— — — — —	9	— — — — —
5	— — — — —	0	— — — — —

ABBREVIATED NUMERALS

1	— — — — —	6	— — — — —
2	— — — — —	7	— — — — —
3	— — — — —	8	— — — — —
4	— — — — —	9	— — — — —
5	— — — — — or —	0	— — — — —

PUNCTUATION AND OTHER SIGNS

Full Stop (.)	— — — — —
Comma (,)	— — — — —
Colon (:)	— — — — —
Hyphen or Dash (-)	— — — — —
Apostrophe (')	— — — — —
Fraction Bar (/)	— — — — —
Separation Sign (between whole number and fraction)	— — — — —
*Brackets [()]	— — — — —
*Underline	— — — — —
Break or Double Dash (=)	— — — — —
Interrogation Mark (?)	— — — — —
Erase (or Error)	— — — — —
Starting Signal	— — — — —
End of Message	— — — — —
Closing Down	— — — — —
Interval (Wait)	— — — — —
Message Received	— — — — —
Ready to Receive	— — — — —
Distress Call or SOS	— — — — —

mitted before and after the word or words affected.

when difficulty arises over any particular letter, to turn to the rhythmic columns, selecting for practice the group in which the troublesome letter is printed in heavy type.

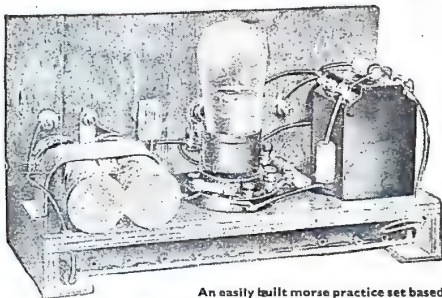
There should be no conscious striving after speed; that will come automatically with practice, and the beginner should keep well within his capacity. In the early stages, especially when one is learning without outside assistance, there is no harm in allowing exaggerated spacing between individual letters, in the manner described when discussing receiving practice. This must not be persisted in too long, however, or the learner may later find difficulty in sending with correct proportional spacing between words and letters. When one's early efforts at sending also serve in providing signals for practising the art of receiving, it may be an advantage to send the letters as fast as possible, but this should not be carried to excess. In particular, the temptation to make the dots too short should be resisted, and their proportional length (one-third that of a dash) should be maintained. Some beginners seem to think that, irrespective of the speed of sending, the dot is the shortest possible signal that can be made.

Equipment

So far, no mention has been made of ways and means of practising. With regard to the morse key, the best advice that can be offered is that the learner should obtain one of the highest quality within his means. Mechanical construction should be good and in particular there should be no suggestion of side-play. For serious work the contacts should be of some non-corroding metal such as tungsten or silver alloy.

For receiver practice the simplest equipment comprises a buzzer wired in series with a key and dry battery. One may listen to the sound of the buzzer either directly or through the intermediary of a pair of head telephones, which can be connected across the buzzer coils in series with a high-value variable resistance or a small condenser to reduce volume to a comfortable level. A microphone hummer is a very satisfactory alternative to the buzzer. A more refined instrument is a valve oscillator, used in conjunction with phones.

Simple AF oscillators generally use the Hartley circuit and a practical design is given on p. 12. The circuit values were worked out for an Osram L21 valve, but an HL2 of about twice the AC resistance gives nearly as good results. Filament current is derived from a 3-volt dry

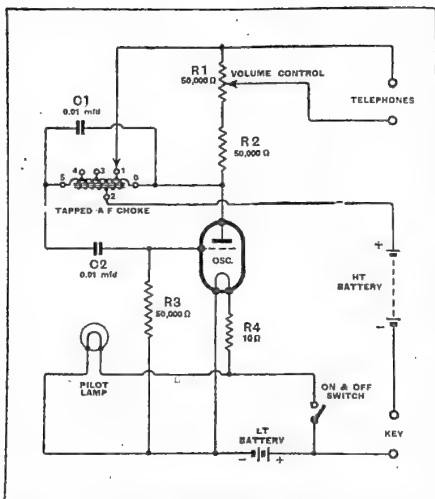


An easily built morse practice set based on the circuit arrangement shown on the following page and designed to reproduce an audible note comparable with that to be heard from a wireless transmitter

cell, and a 10-ohm fixed resistance R_4 is included to drop the surplus voltage. The low-consumption pilot light is not essential, but will probably save its keep by reminding one to switch off the filament current at the end of each practice period.

Most of the components are standard and the tapped choke is the only one which must be chosen with care. The pitch of the note depends upon the inductance of this choke and its tuning condenser C_1 ; with nominal values of 3 henrys and 0.01 mfd. respectively the frequency of oscillation will be very nearly 1,000 cycles per second, which is the pitch preferred by most operators.

Within certain limits, the pitch may be varied by changing the value of C_1 . Thus 0.05 mfd. gives about 400 c/s and 0.005 mfd. tunes to about 1,300 c/s. Outside



LIST OF PARTS

1 AF Choke, 3 henrys, tapped	...	...	Varley DPI8, Bulgin LF43 or Premier C3H
1 Volume Control, 50,000 ohms, R1	...	...	Bulgin VC47 or VC36
2 Resistances, 50,000 ohms, $\frac{1}{2}$ watt, R2, R3	...	...	Bulgin HW23
1 Resistance, 10 ohms, 10 watt, R4	...	...	Bulgin PR94
2 Tubular Condensers, 0.01 mfd., C1, C2	...	...	T.C.C. 451
1 Switch, on-off	...	...	Bulgin S80T
1 Miniature Signal Lamp Fitting	...	...	Bulgin D19
1 Bulb for above, 4 volts, 0.06 amp.	...	...	Bulgin B406
1 Filament Battery	...	...	Drydex C60
1 Anode Battery, 16 $\frac{1}{2}$ volts	...	...	Drydex H1002
1 Valve	...	...	Osram L21

Miscellaneous:

4 Terminals, 2 Wander Plugs, 1 Valveholder (base-mounting),
Wood and screws for panel and baseboard.

these limits the frequency is uncertain, as the grid condenser and leak are apt to take charge and produce "squegging" effects.

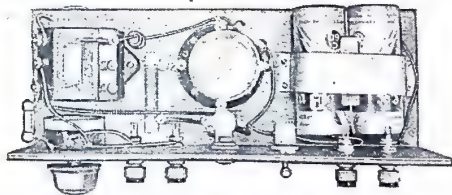
The best connections to tappings on the various makes of choke suggested in the list of parts are given in the table.

	Varley	Bulgin	Premier
To valve anode (and C ₁)	0	Red	1
To grid condenser C ₂ (and C ₁)	5	Black	4
To HT +	2	Yellow	CT
To telephones (and R ₁)	1	Brown	CT

The numbering on the circuit diagram corresponds to the Varley DP18 originally specified.

Although the oscillator will work on less, a full 16½-volt HT supply will ensure a clean steady note of good volume. Telephones of about 2,000 ohms resistance are suitable.

Gramophone records, of which several types have been produced, are especially useful to those who are learning the code without the help of an instructor.



Another view of the practice set, showing how the components are arranged. It should be noted that the positive contact spring of the easily replaceable 3-volt filament battery makes connection with the terminal on the front panel through a brass tongue

The reader who has conscientiously followed the procedure suggested will now have reached a stage where his future progress depends entirely on his own efforts. Practice in sending may sometimes be overdone, but, so far as receiving is concerned, the learner can hardly have too much of it, and should, figuratively speaking, soak himself in an atmosphere of morse.

THE "Q" CODE

An internationally agreed code of abbreviations arranged to meet the principal needs in radio communication. The abbreviations have the meaning given them in the adjacent column, but become a question if followed by an interrogation mark.

Abbreviation	Meaning
QRA	The name of my station is
QRB	The distance between our stations is
QRC	My station is controlled by
QRD	I am bound for from
QRG	Your exact frequency is
QRH	Your frequency varies
QRI	Your note varies
QRJ	Your signals are too weak to read
QRK	The readability of your signals is
QRL	I am busy ; please do not interfere
QRM	Interference is bad
QRN	Atmospherics are bad
QRO	Increase power
QRP	Decrease power
QRQ	Send faster
QRS	Send more slowly
QRT	Stop sending
QRU	I have nothing for you
QRV	I am ready
QRW	Please tell that I am calling him on
QRX	Wait until I call you
QRY	Your turn is No.
QRZ	You are being called by
QSA	The strength of your signals is
QSB	The strength of your signals varies
QSD	Your keying is bad
QSG	Send one message at a time
QSI	The charge per word is
QSK	Continue transmitting

Abbreviation	Meaning
QSL	I have received your message
QSM	Repeat the last message
QSO	I am in communication with
QSP	I will retransmit the message to
QSR	The distress call received from has been cleared
QSU	Send on kilocycles
QSV	Send a series of VVV
QSW	I am going to send on kilocycles
QSX	I am listening for on
QSY	Change to kc/s
QSZ	Send each word twice
QTA	Cancel message
QTB	I do not agree with your number of words
QTC	I have telegrams for you
QTE	Your true bearing is degrees
QTF	The position of your station is
QTG	I will send signals in order that you may take my bearing
QTH	My position is
QTI	My true course is
QTI	My speed is
QTM	I will send radio signals and submarine sound signals
QTA	I am going to communicate with your station by means of the International Code of Signals
QTR	The exact time is
QTU	My station is open from to ...
QUA	Here is some news of
QUB	Here is the information requested
QUC	The last message received by me from is
QUD	I have received the urgency signal sent by
QUF	I have received the distress signal sent by
QUG	I am forced to land
QUH	The present barometric pressure at sea level is
QUI	The true course for you to follow, with no wind, to make for me is degrees
QUK	The sea at is
QUM	The distress traffic is ended

CODE PRACTICE GROUPS

These code groups are so printed that they may be used either horizontally or vertically. The "rhythmic" groups below are for practice in cases where the beginner finds difficulty in transmitting the letter shown in heavy type.

EBGRA
SIRJQ
BGLQV
ZRYAE
AVRMJ

AZBYC
KPLQM
CHMRW
UQMIE
WSOXT

XDWEV
NEROS
DINSX
PLH DU
YEDJC

FUGTH
AFKP V
EJOTY
KGC FB
IOBHN

TAGMS
AGMSY
EKQWR
LEUPK
VSXRR

YFLRX
ETMHB
SXRLF
FYTOJ
WALPV

KGWPV
CIOUZ
BSRXA
ESNID
ZFKPU

URAFE
AWPJD
WRZVQ
MHCGB
EJOTY

DINSC
BCDEL
GBWGT
IPEFQ
FGRGL

HMBGA
ZUPKR
RYETS
RLRKM
WAMRP

EAXIV
AWYIN
ACVHW
JOHPG
FSXVE

SKNAD
TBZDU
SKNAV
TKUA
NBPRF

THWJX
VRSTN
UIVJW
FUJYN
VIXKZ

LZAOC
NABOC
XKLYM
ZKVHT
MNRLJ

QESGU
PDQRE
ZANBO
SFUHW
YETAT

IWKYM
FSTGH
CPDQE
JYLTG
MIFSV

RHYTHMIC GROUPS

MNAFI
ASBOT
RACQT
ENDOT
STEER
TLFIM
WAGAT

MCHUN
AUIRT
NUJAF
TAKAN
RULFN
CAMUN
TANAT

ANOFA
SYPAC
ACQFL
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